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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Yasuhiko WAKABAYASHI

Title: EQUALIZER CIRCUIT AND EQUALIZING
METHOD

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Sir:

This communication is responsive to the Non-Final Office Action dated November 28, 2003, concerning the above-referenced patent application. Reconsideration and reexamination are respectfully requested in view of the following remarks.

Claims 1-14 remain pending. Claims 3, 4, 10 and 11 are allowed. Claims 1, 2, 5-9, and 12-14 are rejected. Applicant respectfully traverses the rejection of claims 1, 2, 5-9, and 12-14 for the reasons that follow.

The Office Action rejects claims 1, 2, 6 and 7 under 35 U.S.C. § 103(a) as being unpatentable over Ariyavitsakul, U.S. Patent No. 5,694,424 in view of Evans, U.S. Patent No. 4,097,806. The Office Action also rejects claims 5 and 12 under § 103(a) based on Ariyavitsakul and Evans, further in view of Fudawa et al., U.S. Patent No. 5,710,792. Claims 8 and 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ariyavitsakul and Evans, further in view of Kaku et al., U.S. Patent No. 6,002,724. Claims 13 and 14 are rejected under § 103(a) as being unpatentable over Ariyavitsakul in view of Evans, Kaku and Fudawa. These rejections are respectfully traversed.

Independent claim 1 is drawn to an equalizer circuit that includes “carrier sensing means for sensing the start of a reception of a signal on the basis of a signal representing a reception level of the reception signal and outputting a detection signal,” “first and second equalizing means for equalizing the reception signal,” “control means for alternately enabling said first and second equalizing means every frame reception in accordance with said detection signal output from said carrier sensing means,” “switching means for alternately switching between outputs from said first and second equalizing means every frame reception and outputting the selected output as demodulation data.” The Office Action alleges that Ariyavasitakul discloses all the features of claim 1 except for the “carrier sensing means,” but contends that Evans teaches such carrier sensing means and it would have been obvious to modify Ariyavasitakul’s device to include such means. Applicant respectfully submits that the Office Action misinterprets Ariyavasitakul.

As a general matter, it is noted that one aspect of the present invention addresses a problem wherein it is not possible to detect a carrier sense signal under certain circumstances, resulting in reception error. Specifically, as described in the background section of Applicant’s invention, in a conventional equalizer circuit, a long inactive interval decreases the information bit rate. When a frame is received during the processing period of the demodulation data with a short inactive interval, the carrier sense signal cannot be detected. The invention overcomes this problem by alternately activating two equalizer circuits, and alternately switching the outputs of those equalizer circuits, every frame reception. For example, in the embodiment of Fig. 1, a reception data switching unit is provided at the output end of equalizer units 4a and 4b. Even if a continuous burst signal having a short inactive interval is input, normal processing can be performed in real time. Additionally, since the units operate for reception during only the carrier sense period, power consumption can be reduced.

In contrast, Ariyavasitakul is directed at a different problem, namely, a technique to provide faster “training” of the equalizer structure. Ariyavasitakul’s device includes a training section 68 and a data detections section whose respective inputs are connected to a switch 66. When the switch is set to the training mode T, the received signal corresponding to the

transmitted training sync word is passed from the training mode T output to the training mode section.

Reflecting these different focuses, Ariyavitsakul lacks several features recited in claim 1. As stated in the Office Action, it does not explicitly disclose means for sensing the start of a reception signal. Additionally, it lacks “control means for alternately enabling said first and second equalizing means every frame reception in accordance with said detection signal output from said carrier sensing means.” The Office Action alleges that the switch 66 constitutes a “control means.” But the switch merely switches the input signal to either the training section of the data detection section, it does not control those circuits. And even if it could be construed in that way, there is no indication that switch 66 alternatively switches between the training section 68 and the data detection section 70 every frame reception. Indeed, since it is conceded that Ariyavitsakul lacks means for sensing the start of a reception signal as provided in claim 1 of the present application, it is not understood how it can be maintained that the switch 68 alternatively enables the training section 68 and the data detection section 70 every frame reception in accordance with said detection signal output from said carrier sensing means.

The Office Action suggests that the switch 66 of Ariyavitsakul somehow controls the training section 68 and the data detection section 70 so as to alternately receives a “frame 26” and a “frame 24.” There is no indication in Ariyavitsakul that a packet is parsed so that overhead symbols 26 are received by the training section 68 and information data 24 is received by the data detection section every other frame. Rather, Ariyavitsakul teaches that during training, switch 66 couples the receiver front end 64 to the training section 68 so that a training signal, which includes training sync words, are provided to the training section 68. (See col. 5, lines 16-19).

Further, Ariyavitsakul lacks “switching means for alternately switching between outputs from said first and second equalizing means every frame reception and outputting the selected output as demodulation data.” The Office Action contends that Ariyavitsakul’s elements 60-90-96 perform the function of the switching means, but this is not the case. As noted above, switch 60 switches the input to the training section 68 and the data detection

section 70, not their respective outputs. Element 90 is not a switch but instead is an element that convolves feedforward filter tap gains. (Column 5, lines 40-45.) Element 96 is a decision means for making a decision on the transmitted symbols. (Column 48-50.)

The secondary references cited in the Office Action fail to disclose, teach or suggest such combination of features recited in claim 1 as discussed above. Thus, the Office Action has failed to set forth a prima facie case of obviousness..

Independent claim 6 is drawn to an equalizing method. That claim recites “detecting the start of a reception signal on the basis of a signal representing a reception level of the reception signal,” “alternately enabling first and second equalizer units for equalizing the reception signal upon detecting the start of the reception signal”, and “alternately switching between outputs from said first and second equalizer units every frame reception and outputting the selected output as demodulation data.” As discussed above, it is not seen that the Ariyavitsakul discloses, teaches or suggests any of these features, nor to does Evans suggest modifying Ariyavitsakul’s disclosed technique to include them.

Independent claims 8 and 9 are also drawn to equalizing methods. Among other features, both those claims recite “alternately switching between outputs from said first and second equalizer units every frame reception and outputting the selected output as demodulation data.”

For at least these reasons, it is respectfully submitted that all pending claims are patentable over the cited prior art.

Conclusion

Applicant believes that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

Date 1/30/04

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